

Evolution and Current Status of EPA's Efforts to Accurately Estimate Pesticide Concentrations in Drinking Water for Tolerance Reassessment

I. Introduction

With the passage of the FQPA, EPA was directed to factor into its human health risk assessment for purposes of setting tolerances, “all anticipated dietary exposures and all other exposures for which there is reliable information”. EPA has interpreted this provision as requiring it to factor into its human health risk assessment anticipated exposures to pesticides in drinking water. EPA's long term goal is to develop accurate estimates of the distribution of pesticide concentrations in drinking water for use in probabilistic human health risk assessments. EPA's interim goal has been to accurately identify those pesticides that are more likely to be present in drinking water at levels of concern and to use all available data to produce the best possible estimates of the concentrations of these pesticides in drinking water in areas of use.

Since August of 1996, EPA has continuously worked to improve its methods, approaches, and procedures for estimating pesticide concentrations in drinking water. Initially, we used a standard default assumption (of 10% of exposure to a pesticide attributable to drinking water). Then, beginning around November 1997, we began to routinely use scientific models (with extensive amounts of pesticide-specific fate and transport data) and available monitoring data to identify those pesticides that were more likely to present a concern through the drinking water route.

Most recently, we have developed a new model scenario and new approaches to evaluating monitoring data that provide an increasingly better understanding of the potential contribution of pesticides in drinking water to human exposure.

This paper provides a short summary of the evolution in our approaches and references documents which provide more background and detail on our evolving approaches. [Paper #1 (Background Paper) was developed for the initial TRAC meeting in May and provides a more in depth discussion of the evolution of our approaches up until May 1998. Paper #2 (July 1998 FIFRA SAP Presentation) is a compilation of presentations recently made to the FIFRA SAP. These papers describe efforts made since May 1998 to improve drinking water assessments.]

II. OPP's Approaches to Addressing the FQPA Water Issue

August 1996

In the initial months after the enactment of FQPA (while OPP quickly worked to develop a science-based approach for estimating drinking water exposure) OPP adopted an interim approach which assumed that 10% of what it considered acceptable exposure to a pesticide would occur via the drinking water route (PRN 97-1). That is, OPP reserved 10% of the “risk cup” for water-related risks and allowed food residues to take up to 90% of the “acceptable” risk. This 10% value for drinking water was a “default” assumption that OPP knew was likely to over-estimate actual exposure in many cases, while potentially underestimating actual exposures in some others.

November 1997 Policy

Based on our experience with the 10% default assumption and our further analysis of available information, in November 1997 OPP developed new tools and adopted the following approach for factoring drinking water into tolerance decisionmaking (see the attached November 1997 policy for more in-depth discussion of this approach). This approach underwent external scientific peer review by an International Life Sciences Institute (ILSI) panel and the FIFRA Scientific Advisory Panel (FIFRA SAP). With the adoption of this approach, EPA

moved from the use of default assumptions to a more scientifically sound and defensible approach. The major elements of the approach included:

1. The review of substantial amounts of registrant-submitted data about the mobility, persistence, and degradation pathways of the pesticide in soil and water;
2. The use of these pesticide-specific data in “screening level” models (GENEEC and PRZM/EXAMS for surface water and SCIGROW for groundwater). The data used in these models include pesticide-specific data on whether the pesticide has a tendency to bind to soil or move into water, its vapor pressure, how quickly it breaks down in water and soil, and how much is applied. These models allow OPP to develop rough estimates of pesticide concentrations in surface water and groundwater. The models are based on 20 plus years of experience in studying how pesticides move in the environment and are based on a good understanding of the key characteristics of pesticides which determine where they are likely to move in the environment. OPP views the estimates coming out of these models as upper bound estimates of potential pesticide concentrations in drinking water. *(During this stage of the process, OPP also conducts an initial review of in-house water monitoring data to check to be sure that the screening level estimates are in fact “upper bound” estimates. If OPP finds that readily accessible monitoring data suggest the possibility of higher concentrations in surface or groundwater than what these models indicate, then OPP immediately moves to a more thorough analysis of available monitoring data.);*
3. The comparison of model estimates (i.e., levels which OPP views as upper bound estimates of potential pesticide levels in drinking water) to human health-based “drinking water levels of concern” (which are arrived at *after* having first considered all food-related exposures). Based on this comparison, OPP either clears the pesticide from a drinking water perspective OR it attempts to refine its estimates of pesticide concentrations in order to make them less worst case and more realistic; and

4. The refinement of estimates through an evaluation and characterization of available water monitoring data.

Current Approach and Status of Efforts to Improve Current Approach

EPA has, since November 1997, continued to improve its approach and its understanding of the accuracy of its estimates based on model results. The peer reviews completed by both ILSI and the FIFRA SAP on the November 1997 approach produced several recommendations that EPA has followed-up on. In particular, EPA has developed a more appropriate “reservoir” scenario to replace the “farm pond” for purposes of estimating pesticide concentrations in drinking water derived from surface water and has conducted further comparisons of model outputs to measured values. (See “Index Reservoir” Presentation Paper from July 1998 FIFRA SAP). In addition, EPA is in the process of developing the needed tools to allow us to account for the % cropped area around a water body and the % of the crop treated with the pesticide to allow for even more accurate estimates of pesticide levels in drinking water derived from surface water. EPA expects to be able to implement the % cropped area modification to its approach in the early fall of 1998.

OPP is also working with ILSI to hold another working group discussion in the fall of 1998 to more fully explore what is specifically needed in terms of data and models/tools in order to move forward to conduct probabilistic assessments of drinking water exposure for use in human health risk assessments.